Amendments to the claims:

1.   (Currently Amended) A method for enhanced imaging of a target medium comprising:

using optical tomography to direct ~~directing~~ energy into a target medium from at least one source during a period of time, the target medium having dynamic properties during the period of time;

wherein the energy from the at least one source is highly scattered by the target medium and emerges from the target medium at different locations around the target medium;

measuring the ~~density of the~~ energy emerging from the target medium during the period of time using a plurality of ~~t least one~~ detectors positioned to detect the emerging energy at the different locations; ~~;~~

the ~~density of the~~ energy emerging from the target medium at the different locations being a function of the dynamic properties of the target medium; and

generating a map of the dynamic properties of the target medium based on the measured ~~density of~~ energy emerging from the target medium at the different locations.

2.   (Currently Amended) The method of claim 1, further comprising:

generating a time series of images of the properties of ~~a~~ the target medium based on the measured energy emerging from the target medium, wherein each image represents the cross-sectional properties of the target medium at a time interval during the period of time.

3.   (Original)   The method of claim 2, wherein generating the map of the dynamic properties of the target medium comprises processing the time series of images using time series analysis methods.

4.   (Currently Amended) The method of claim 1, wherein generating the map of the dynamic properties of the target medium comprises processing the measured energy at each of the plurality of detectors using time series analysis methods.

5.   (Cancelled)

6.   (Currently Amended) The method of claim ~~5~~ 1, wherein the <u>map of the dynamic properties is generated using</u> time series analysis methods <u>that</u> comprise linear time series methods.

7.   (Original)   The method of claim 6, wherein the linear time series analysis methods are at least one of frequency analysis, time correlation analysis, time frequency analysis and principle component analysis.

8.   (Cancelled).

9.   (Cancelled).

10.   (Original)   The method of claim 1, further comprising applying a provocation to the target medium.

11.   (Currently Amended) The method of claim 1<u>0</u>, wherein the target medium ~~is~~ <u>comprises</u> human tissue having a vascular tree and the provocation has a dynamic ~~effects~~ <u>effect</u> on the vascular tree.

12.   (Currently Amended) The method of claim 11, wherein the provocation ~~is~~ <u>comprises</u> an autonomic stimulus.

13.   (Currently Amended) The method of claim 11, wherein the provocation ~~is~~ <u>comprises</u> a local stimulus.

14.   (Currently Amended) The method of claim 1, wherein the energy ~~is~~ <u>comprises</u> optical energy having a wavelength in the near infrared region of the electromagnetic spectrum.

4

15. (Original) The method of claim 14, wherein the optical energy directed toward the medium includes at least two wavelengths of near infrared energy.

16. (Currently Amended) The method of claim 14, wherein the target medium is comprises human tissue having a vascular tree containing blood, the vascular tree comprising veins, arteries and micro vessels, the blood having time varying absorption and scattering properties to the near infrared energy as a function of blood oxygenation and blood volume.

17. (Currently Amended) The method of claim 16, wherein generating an image a map of the dynamic properties of the target medium comprises generating an image of at least one of the time varying absorption and scattering properties of the target medium.

18. (Currently Amended) The method of claim 16, wherein generating an image a map of the dynamic properties of the target medium further comprises using time series analysis to enhance the contrast of at least one of veins, arteries and micro vessels.

19. (Currently Amended) The method of claim 1, wherein the energy is comprises optical energy in the visible spectrum.

20. (Cancelled).

21. (Currently Amended) The method of claim 20 28, wherein the relative energy measurements are the relative differences between a measure at an instant in time and a time average mean of measures during the period of time.

22. (Currently Amended) A system for enhanced imaging of a target medium, comprising:

a source for using optical tomography to direct directing energy into a target medium from at least one source during a period of time, the target medium having dynamic properties during the period of time;

wherein the energy from the at least one source is highly scattered by the target medium and emerges from the target medium at different locations around the target medium;

a plurality of detectors ~~detector~~ positioned at the different locations for measuring the ~~density of the~~ energy emerging from the different locations of the target medium during the period of time ~~using at least one detector~~, the ~~density of the~~ energy emerging from the target medium at the different locations being a function of the dynamic properties of the target medium;

a data acquisition means for receiving the measured energy ~~densities~~ during the period of time; and

a computer ~~connected~~ responsive to the data acquisition means, the computer having code for generating a map of the dynamic properties of the target medium based on the measured ~~density of~~ energy emerging from the target medium at the different locations.

23.   (Currently Amended) The system of claim 22, wherein the computer further includes code for generating a time series of images of the properties of the ~~a~~ target medium based on the measured energy emerging from the target medium, wherein each image represents the cross-sectional properties of the target medium at a time interval during the period of time.

24.   (Original)   The system of claim 23, wherein the computer further includes code for processing the time series of images using time series analysis methods to generate the map of the dynamic properties.

25.   (Original)   The system of claim 24, wherein the computer further includes code for processing the measured energy at each detector using time series analysis methods to generate the map of the dynamic properties of the medium.

26.   (New) A method for enhanced imaging of a target medium comprising:

directing energy into a target medium from at least one source during a period of time, the target medium having dynamic properties during the period of time;

6

measuring the energy emerging from the target medium during the period of time using at least one detector, the energy emerging from the target medium being a function of the dynamic properties of the target medium; and

generating a map of the dynamic properties of the target medium based on the measured energy emerging from the target medium, and using nonlinear time series analysis methods.

27.   (New) A method for enhanced imaging of a target medium comprising:

directing energy into a target medium from at least one source during a period of time, the target medium having dynamic properties during the period of time;

measuring the energy emerging from the target medium during the period of time using at least one detector, the energy emerging from the target medium being a function of the dynamic properties of the target medium; and

generating a map of the dynamic properties of the target medium based on the measured energy emerging from the target medium;

wherein the energy is measured by a plurality of measurements collected at a sampling rate not less than twice the reciprocal of the highest frequency of a dynamic property to be imaged.

28.   (New) A method for enhanced imaging of a target medium comprising:

directing energy into a target medium from at least one source during a period of time, the target medium having dynamic properties during the period of time;

measuring the energy emerging from the target medium during the period of time using at least one detector, the energy emerging from the target medium being a function of the dynamic properties of the target medium; and

generating a map of the dynamic properties of the target medium based on the measured energy emerging from the target medium; wherein:

the measured energy is processed using a modified perturbation formulation of a radiation transport equation; and

the modified perturbation formulation uses relative energy measurements.